

WHAT IS CLAIMED IS:

- 1 *Sub*
2 *213*
- 3 1. A vascular prosthesis comprising:
4 an expansible structure which is implantable within a body lumen; and
means on or within the structure for releasing methylprednisolone into the
body lumen to inhibit smooth muscle cell proliferation.
 - 1 2. A prosthesis as in claim 1, wherein methylprednisolone is released at a
2 rate between 5 µg/day to 200 µg/day.
 - 1 3. A prosthesis as in claim 1, wherein methylprednisolone is released at a
2 rate between 10 µg/day to 60 µg/day.
 - 1 4. A prosthesis as in claim 1, wherein methylprednisolone is released at
2 an initial phase wherein a rate of methylprednisolone release is between 0 µg/day to 50
3 µg/day and a subsequent phase wherein a rate of methylprednisolone release is between 5
4 µg/day to 200 µg/day.
 - 1 5. A prosthesis as in claim 1, wherein methylprednisolone is released at
2 an initial phase wherein a rate of methylprednisolone release is between 5 µg/day to 30
3 µg/day and a subsequent phase wherein a rate of methylprednisolone release is between 10
4 µg/day to 100 µg/day.
 - 1 6. A prosthesis as in claim 1, wherein methylprednisolone is released at
2 an initial phase wherein a rate of methylprednisolone release is between 40 µg/day to 300
3 µg/day and a subsequent phase wherein a rate of methylprednisolone release is between 1
4 µg/day to 100 µg/day.
 - 1 7. A prosthesis as in claim 1, wherein methylprednisolone is released at
2 an initial phase wherein a rate of methylprednisolone release is between 40 µg/day to 200
3 µg/day and a subsequent phase wherein a rate of methylprednisolone release is between 10
4 µg/day to 40 µg/day.
 - 1 8. A prosthesis as in claim 1, wherein methylprednisolone is released at a
2 constant rate between 5 µg/day to 200 µg/day.
 - 1 9. A prosthesis as in claim 1, wherein a total amount of
2 methylprednisolone release is in a range from 100 µg to 10 mg.

1 10. A prosthesis as in claim 1, wherein a total amount of
2 methylprednisolone release is in a range from 300 µg to 2 mg.

1 11. A prosthesis as in claim 1, wherein a total amount of
2 methylprednisolone release is in a range from 500 µg to 1.5 mg.

1 12. A prosthesis as in claim 1, wherein a mammalian tissue concentration
2 of methylprednisolone at an initial phase is within a range from 0 µg/mg of tissue to 100
3 µg/mg of tissue.

1 13. A prosthesis as in claim 1, wherein a mammalian tissue concentration
2 of methylprednisolone at an initial phase is within a range from 0 µg/mg of tissue to 10
3 µg/mg of tissue.

1 14. A prosthesis as in claim 1, wherein a mammalian tissue concentration
2 of methylprednisolone at a subsequent phase is within a range from 1 picogram/mg of tissue
3 to 100 µg/mg of tissue.

1 15. A prosthesis as in claim 1, wherein a mammalian tissue concentration
2 of methylprednisolone at a subsequent phase is within a range from 1 nanogram/mg of tissue
3 to 10 µg/mg of tissue.

1 16. A prosthesis as in claim 1, wherein the expansible structure is a stent or
2 graft.

1 17. A prosthesis as in claim 1, wherein the means for releasing
2 methylprednisolone comprises a matrix formed over at least a portion of the structure.

1 18. A prosthesis as in claim 17, wherein the matrix is composed of a
2 material which undergoes degradation.

1 19. A prosthesis as in claim 17, wherein the matrix is composed of a
2 nondegradable material.

1 20. A prosthesis as in claim 19, wherein methylprednisolone is released by
2 diffusion through the nondegradable matrix.

1 21. A prosthesis as in claim 17, wherein the matrix comprises multiple
2 layers, wherein at least one layer contains methylprednisolone and another layer contains
3 methylprednisolone, at least one substance other than methylprednisolone, or no substance.

1 22. A prosthesis as in claim 21, wherein the at least one substance other
2 than methylprednisolone is an immunosuppressive substance selected from the group
3 consisting of rapamycin, mycophenolic acid, riboflavin, tiazofurin, mizoribine, FK 506,
4 zafurin, and methotrexate.

1 23. A prosthesis as in claim 21, wherein the at least one substance other
2 than methylprednisolone is an agent selected from the group consisting of anti-platelet agent,
3 anti-thrombotic agent, and IIb/IIIa agent.

1 24. A prosthesis as in claim 1, wherein the means for releasing
2 methylprednisolone comprises a rate limiting barrier formed over at least a portion of the
3 structure.

1 25. A prosthesis as in claim 24, wherein methylprednisolone is released by
2 diffusion through the rate limiting barrier.

1 26. A prosthesis as in claim 1, wherein the means for releasing
2 methylprednisolone comprises a reservoir on or within the structure containing
3 methylprednisolone and a cover over the reservoir.

1 27. A prosthesis as in claim 1, wherein methylprednisolone is on or within
2 the expansible structure.

1 28. A prosthesis as in claim 1, wherein methylprednisolone is disposed
2 within a matrix or rate limiting membrane.

1 29. A vascular prosthesis comprising:
2 an expansible structure implantable within a body lumen; and
3 a rate limiting barrier on the structure for releasing methylprednisolone into
4 the body lumen to inhibit smooth muscle cell proliferation;
5 wherein the barrier comprises multiple layers, each layer comprising parylast
6 or paralene and having a thickness in a range from 50 nm to 10 microns.

1 30. A prosthesis as in claim 29, wherein methylprednisolone is released at
2 a rate between 5 µg/day to 200 µg/day.

1 31. A prosthesis as in claim 29, wherein methylprednisolone is released at
2 a rate between 10 µg/day to 60 µg/day.

1 32. A prosthesis as in claim 29, wherein at least one layer contains
2 methylprednisolone and another layer contains methylprednisolone, at least one substance
3 other than methylprednisolone, or no substance.

1 33. A vascular prosthesis comprising:
2 an expansible structure;
3 a source of methylprednisolone on or within the structure, wherein the
4 methylprednisolone is released from the source when the expansible structure is implanted in
5 a blood vessel; and
6 a source of at least one other substance in addition to methylprednisolone on
7 or within the structure, wherein the at least one additional substance is released from the
8 source when the expansible structure is implanted in a blood vessel.

1 34. A prosthesis as in claim 33, wherein the at least one additional
2 substance is an immunosuppressive substance selected from the group consisting of
3 rapamycin, mycophenolic acid, riboflavin, tiazofurin, mizoribine, FK 506, zafurin, and
4 methotrexate.

1 35. A prosthesis as in claim 33, wherein the at least one additional
2 substance comprises at least one agent selected from the group consisting of anti-platelet
3 agent, anti-thrombotic agent, and IIb/IIIa agent.

1 36. A prosthesis as in claim 33, wherein each source comprises a matrix,
2 rate limiting membrane, or reservoir.

1 37. A method for inhibiting restenosis in a blood vessel following
2 recanalization of the blood vessel, said method comprising:
3 implanting a vascular prosthesis in the blood vessel; and
4 releasing methylprednisolone into the blood vessel so as to inhibit smooth
5 muscle cell proliferation.

1 38. A method as in claim 37, wherein methylprednisolone is released at a
2 rate between 5 µg/day to 200 µg/day.

1 39. A method as in claim 37, wherein methylprednisolone is released at a
2 rate between 10 µg/day to 60 µg/day.

1 40. A method as in claim 37, wherein methylprednisolone is released
2 within a time period of 1 day to 45 days in a vascular environment.

1 41. A method as in claim 37, wherein methylprednisolone is released
2 within a time period of 7 days to 21 days in a vascular environment.

1 42. A method as in claim 37, further comprising releasing at least one
2 other substance in addition to methylprednisolone simultaneously with methylprednisolone
3 release.

1 43. A method as in claim 37, further comprising releasing at least one
2 other substance in addition to methylprednisolone sequentially with methylprednisolone
3 release.

1 44. A method as in claim 42 or 43, wherein the at least one additional
2 substance is an immunosuppressive substance selected from the group consisting of
3 rapamycin, mycophenolic acid, riboflavin, tiazofurin, mizoribine, FK 506, zafurin, and
4 methotrexate.

1 45. A method as in claim 37, wherein the releasing comprises delaying
2 substantial release of methylprednisolone for at least one hour following implantation of the
3 prosthesis.

1 46. A method as in claim 45, wherein delaying release comprises slowing
2 release from a reservoir with a material that at least partially degrades in a vascular
3 environment over said one hour.

1 47. A method as in claim 45, wherein delaying release comprises slowing
2 release with a matrix that at least partially degrades in a vascular environment over said one
3 hour.

1 48. A method as in claim 45, wherein delaying release comprises slowing
2 release with a nondegradable matrix that allows diffusion of methylprednisolone through the
3 nondegradable matrix after said one hour.

1 49. A method as in claim 45, wherein delaying release comprises slowing
2 release with a rate limiting barrier that allows diffusion of methylprednisolone through the
3 barrier after said one hour.

1 50. A method as in any one of claims 47-49, wherein the prosthesis is
2 coated with the matrix or barrier by spraying, dipping, deposition, or painting.

1 51. A method as in claim 37, wherein the prosthesis incorporates
2 methylprednisolone by coating, spraying, dipping, deposition, chemical bonding, or painting
3 methylprednisolone on the prosthesis.

1 52. A method for inhibiting restenosis in a blood vessel following
2 recanalization of the blood vessel, said method comprising:
3 implanting a vascular prosthesis in the blood vessel; and
4 releasing methylprednisolone and at least one other substance in addition to
5 methylprednisolone from the prosthesis when implanted in the blood vessel.

1 53. A method as in claim 52, wherein the at least one additional substance
2 is an immunosuppressive substance selected from the group consisting of rapamycin,
3 mycophenolic acid, riboflavin, tiazofurin, mizoribine, FK 506, zafurin, and methotrexate.

1 54. A method as in claim 53, wherein the immunosuppressive substance is
2 mycophenolic acid.

1 55. A method as in claim 53, wherein the immunosuppressive substance is
2 mizoribine.

1 56. A method as in claim 52, wherein methylprednisolone is released
2 within a time period of 2 days to 3 months.

1 57. A method as in claim 52, wherein the at least one additional substance
2 comprises at least one agent selected from the group consisting of anti-platelet agent, anti-
3 thrombotic agent, and IIb/IIIa agent.

1 58. A method as in claim 52, wherein methylprednisolone and the at least
2 one additional substance are released simultaneously.

1 59. A method as in claim 52, wherein methylprednisolone and the at least
2 one additional substance are released sequentially.

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